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Global Applications of S&P 500® Sectors

EXECUTIVE SUMMARY

This paper examines the applications of U.S. sector indices in a portfolio context, from the perspective of both international and domestic investors. We shall:

- Outline the Global Industry Classification Standard (**GICS**)® classifications of sector and industry groups;
- Illustrate the importance of sectors in **determining portfolio returns**, in relative and absolute terms;
- Demonstrate the importance of the U.S. market in **accessing global industries** and sectors, and illustrate the **growth in related products**;
- Illustrate the potential applications of sectors in achieving **diversification** goals;
- Indicate how sectoral groupings help **connect broader trends to their market effects**;
- Compare the **effectiveness of sector-selection** and stock-selection strategies;
- Show that—in a multi-asset context—the impact of changing the mix of equity sectors can be **comparable to the impact of adjusting stock and bond allocations**; and
- Provide a **long-term perspective on the sectoral composition** of the U.S. market.

The first few sections summarize the importance and classification of sectors, offer basic examples of international applications, and highlight the growth of related products. Readers interested in more advanced topics related to tactical sector rotation strategies will find them addressed in the later sections.

GICS DEFINITIONS AND INDICES

Sectoral benchmarks have a long history. Indeed, when the Dow Jones Industrial Average® was first published in 1896, its developer Charles Dow

had been publishing an 11-stock "Railroad Average" for over a decade.[1] Ever since, industry-specific indices have been used to assess particular market segments or to anticipate nascent economic developments.

It is useful to have different degrees of granularity, for purposes of comparison: an investment in a railroad stock might be compared to the performance of a railroad index, or to a broader transportation index, or even yet to the entire industrial sector or the whole market. Over time, sector and industry indices serving the needs of both granular and broad market benchmarking purposes were developed by index providers such as S&P Dow Jones. However, **the definitions of the various equity groupings remained subjective**, along with the classifications of each company. We may disagree, for example, as to whether the corporate owners of an internet search engine should be classified as a technology company, or—supposing they make the majority of their revenues from advertising—as a media company. Historically, a smorgasbord of different sectoral taxonomies emerged, leading to a wide range of good-natured disagreement over which classification system was most appropriate. **In August 1999, two of the leading index providers, S&P Indices (a predecessor of S&P Dow Jones Indices) and MSCI joined forces to produce the Global Industry Classification Standard** (**GICS**). This provided a shared method that unified definitions across the two companies' indices.

The now widely adopted GICS system harmonized definitions between S&P Dow Jones Indices and MSCI.

Now a widely recognized standard, GICS assigns each company to one of 157 possible sub-industries, which then determine—in decreasing order of granularity—one of 68 possible industries, one of 24 possible industry groups, and one of 11 possible sectors. Exhibit 1 summarizes the GICS hierarchy and, for illustrative purposes, highlights some resulting statistics as applied to three popular benchmarks. While the top-level sectors are represented in most markets, in any given benchmark, some sub-industries may be represented by only a few or even by no stocks at all.[2]

[1] The Railroad Average—today known as the Dow Jones Transportation Average—began publication in 1884 and was arguably the first ever mainstream stock market index. At inception, it was a price-weighted average of 11 companies, 9 of which were railroads. (Western Union and the Pacific Mail Steamship Company completed the set.)

[2] For example, as of December 2017, only 127 of the possible 157 sub-industries were represented by at least one constituent of the S&P 500.

Exhibit 1: GICS Hierarchy

CLASSIFICATION LEVEL	NUMBER OF SEGMENTS	AVERAGE NUMBER OF CONSTITUENTS PER SEGMENT			EXAMPLE	CURRENT WEIGHT IN THE S&P GLOBAL BMI (%)
		S&P 500	S&P TMI	S&P GLOBAL BMI		
Sector	11	46	344	1,027	Industrials	12.2
Industry Group	24	21	158	471	Transportation	2.5
Industry	68	7	56	166	Road & Rail	1.1
Sub-Industry	157	3	24	72	Railroads	0.9

Source: S&P Dow Jones Indices LLC. Data as of December 2017. Table is provided for illustrative purposes.

The GICS hierarchy places sectors at the top and sub-industries at the bottom.

The GICS "bottom-up" approach allows subindices to be combined in a variety of different ways. (Appendix B provides some of the more widely followed examples.) The resulting indices are typically capitalization- or equal-weighted, although caps on the level of concentration are not uncommon. Unless otherwise stated, we shall use the full GICS classifications and the corresponding capitalization-weighted indices for purposes of exhibits, indicating at each point whether we are referring to a sector, industry group, industry, or sub-industry index.

THE IMPORTANCE OF SECTORS TO RETURNS

Industry effects are a significant component in *individual* equity returns…

The measured *value* (or importance) of industry and sector effects in explaining the performance of stocks (or stock portfolios) varies significantly according to how and where one measures it, what other factors are controlled for, and over what time period the study was conducted. Suffice it to say, most studies show industry effects to be material and, typically, **an individual firm's performance will be strongly correlated to that of its sector**. For example, consider that in the 10-year period ending March 2018, the average correlation-squared of daily price movements between each stock in the S&P 500 and its respective sector index was around 0.47, compared with an average correlation-squared of 0.31 between each stock and the benchmark. In practical terms, **sectoral effects therefore could be said to explain roughly half of the variance in daily returns** of the average constituent over the year, while the market's movements explained only roughly one-third.[3]

… while industry weights are a significant determinant of equity *portfolio* returns.

Meanwhile, the industry or sector composition of an equity *portfolio* is a widely acknowledged determinant of returns. Sector and industry variables provide fundamental components of most commercial risk models. Sector-based analysis is also the second-most common form of portfolio return attribution study, after its asset-class-based equivalents.[4] Accordingly, the

[3] Based on monthly correlation statistics sourced from S&P Dow Jones Indices, as of March 2018. The square of the correlation statistic, or "coefficient of determination," here provides the proportion of variation in one variable that may be explained by variation in another.

[4] The practice of sector-based attribution was an instantly adopted application of original concepts credited to Brinson, Gary, Randolf Hood & Gilbert Beebower; "Determinants of Portfolio Performance"; *Financial Analysts Journal,* Vol. 42, (1986).

differences between the sectoral and industrial makeup of indices and portfolios can offer **an immediate and frequently insightful perspective on their relative returns**.[5] A common example, well studied in literature, is offered by the performances of equity markets in different countries.

CONCENTRATIONS IN SECTORS ACROSS GEOGRAPHIES

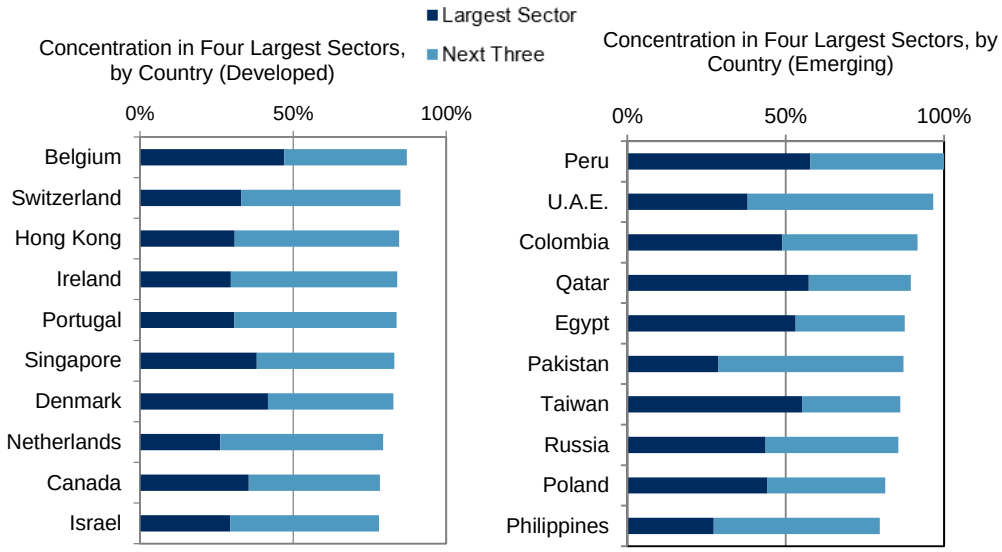
The industry effects on single-country equity benchmark returns are material, and well-studied.

The importance of sectoral perspectives in examining single-country equity performance has a long record in academic literature, going back at least to Richard Roll's paper in 1992, which showed that varying **industry compositions were a paramount driver of the differences between—and correlations among—international stock markets.**[6]

Naturally, some countries (and some portfolios) are more concentrated than others. This is particularly important in the context of the observed propensity for investors to maintain a so-called "**home bias**"—understood as an overweight to their domestic and near-domestic markets.[7] As Exhibit 2 illustrates, **investors based in some countries can end up with rather concentrated sector exposures**.

Some countries are more concentrated than others.

Exhibit 2: Sectorally Concentrated Countries in the S&P Global BMI



Source: S&P Dow Jones Indices LLC. Data as of December 2017. Chart is provided for illustrative purposes.

[5] To provide a specific, non-geographic example, the total returns achieved in 2017 by the various S&P 500 "factor" or "smart beta" indices may be seen to be highly correlated to the weight each had maintained in the information technology sector—which had risen considerably over the year. (Source: S&P 500 Q4 2017 Factor Dashboard.)

[6] Roll, Richard; "Industrial Structure and the Comparative Behavior of International Stock Market Indices"; *The Journal of Finance*, Vol 47 (1992).

[7] The "home bias" of equity investors has been a topic of study at least since Levy, Haim and Marshall Sarnat; "International Diversification of Investment Portfolios", *American Economic Review* Vol. 60 (1970). For a more recent review of the literature, see Cooper, Ian, Piet Sercu, and Rosanne Vanpée; "The Equity Home Bias Puzzle: A Survey", Foundations and Trends® in *Finance*: Vol. 7 (2013).

Home-biased investors in Belgium, Switzerland, and Peru might find the goal of diversifying their sectoral allocations a more pressing concern than investors in other nations, but in fact *every* country has some degree of concentration—and must face the accompanying consequences.

Consider the UK (and the associated broad-based equity benchmark offered by the S&P United Kingdom BMI). In relative terms, the UK is not a particularly concentrated market; its 61% total weight in its largest four sectors (namely consumer discretionary, consumer staples, energy, and financials) places it 41st out of 45 by concentration in the S&P Global BMI. Nonetheless, those four sectors have driven a significant proportion of the UK benchmark's returns.

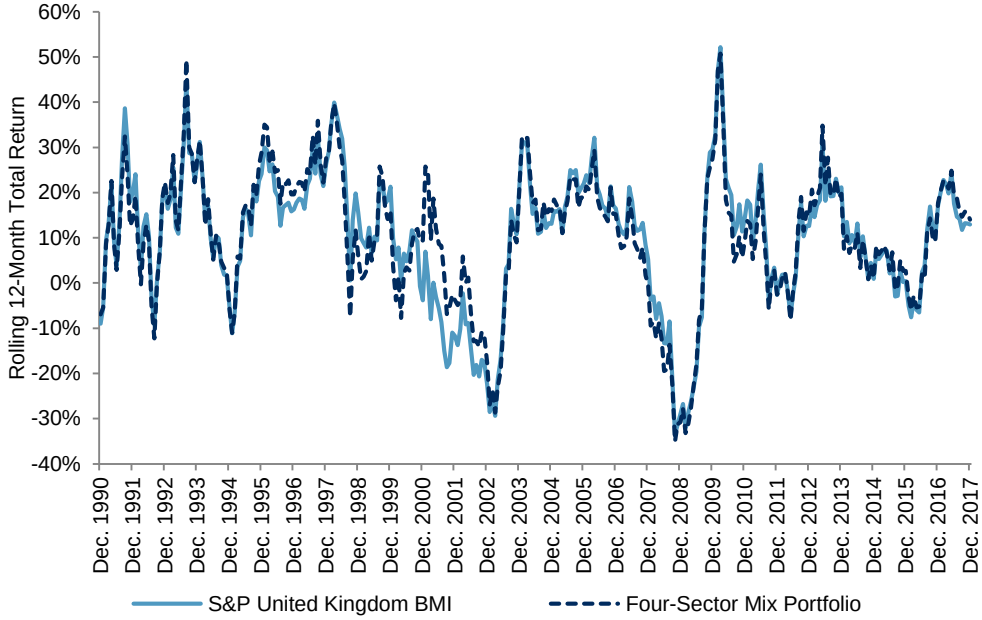
The returns of even (relatively) diversified countries can be driven by a few sectors—as the UK demonstrates.

Exhibit 3 compares the rolling 12-month total returns of the S&P United Kingdom BMI to a capitalization-weighted portfolio formed from the UK's four largest sectors. As Exhibit 4 shows, over a majority of 12-month periods, the S&P United Kingdom BMI's total return closely matched that of a mix of the four largest sectors.

The two series overlap near-perfectly.

The performance of the technology sector explains the early 2000s period, when they differ.

Exhibit 3: S&P United Kingdom BMI Versus Four-Sector Mix Portfolio



Source: S&P Dow Jones Indices LLC. Data as of December 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

If the overall similarity between the two series in Exhibit 3 illustrates the impact of *overweighting* certain sectors (or overconcentrating), **the points where the series diverge may be instructive as to the consequences of *excluding* certain sectors**.

In particular, note the divergence of the two series in Exhibit 3 between August 2000 and March 2003. By the end of August 2000, the information

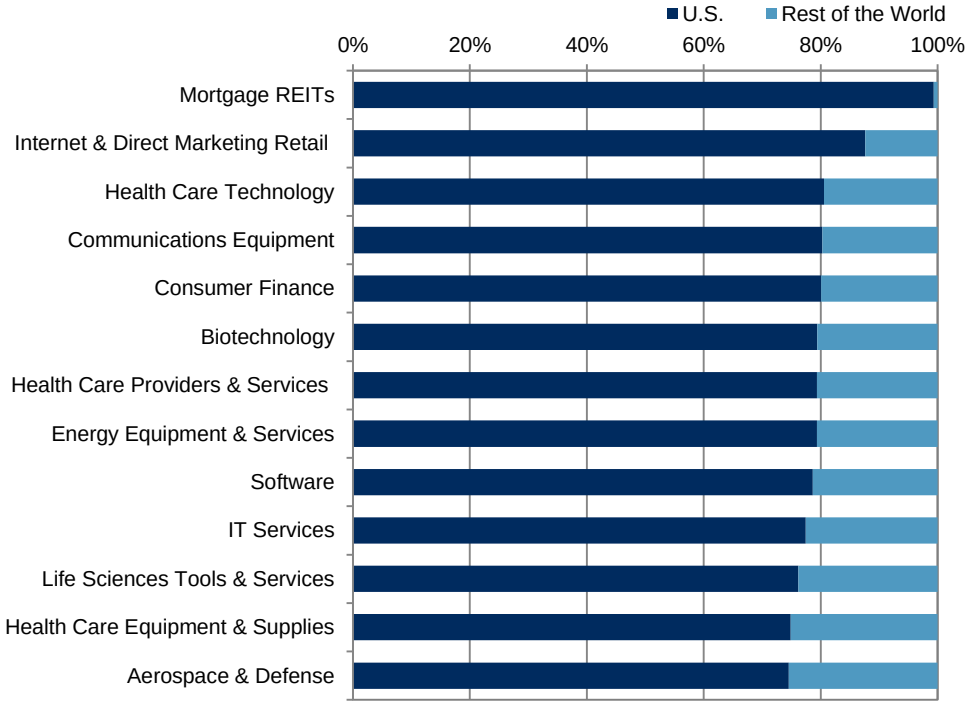
technology sector of the S&P United Kingdom BMI could boast a 123% total return over the prior 12 months—more than doubling its weight to represent over 6.65% of the UK's benchmark. By March 2003, the same sector had fallen by more than 92% in value, and its weight dropped to near zero, a position from which it has barely recovered, even today. **The decline in the information technology sector was a significant contributor to the difference between the two series between August 2000 and March 2003**; indeed it may be identified as the *primary cause* of their divergence.

But what, if anything, might an investor do about the risks of sectoral concentration? Certainly, a UK investor might consider overallocating to domestic companies outside of the largest four sectors. However, **diversification within some industries can prove difficult without reaching toward international stocks, and toward the U.S. market in particular**.

In fact, of the 68 GICS industries in the S&P Global BMI as of December 2017, nearly half (31) had more than 50% of their total capitalization based in a *single* country; without exception, **that country was the United States.** Illustrating the most extreme examples, Exhibit 4 displays the 11 industries where U.S.-domiciled companies accounted for more than 75% of the global weight in the S&P Global BMI.

Diversification in some industries may require an allocation to U.S. markets.

Exhibit 4: Industries Concentrated in a Single Country (S&P Global BMI)



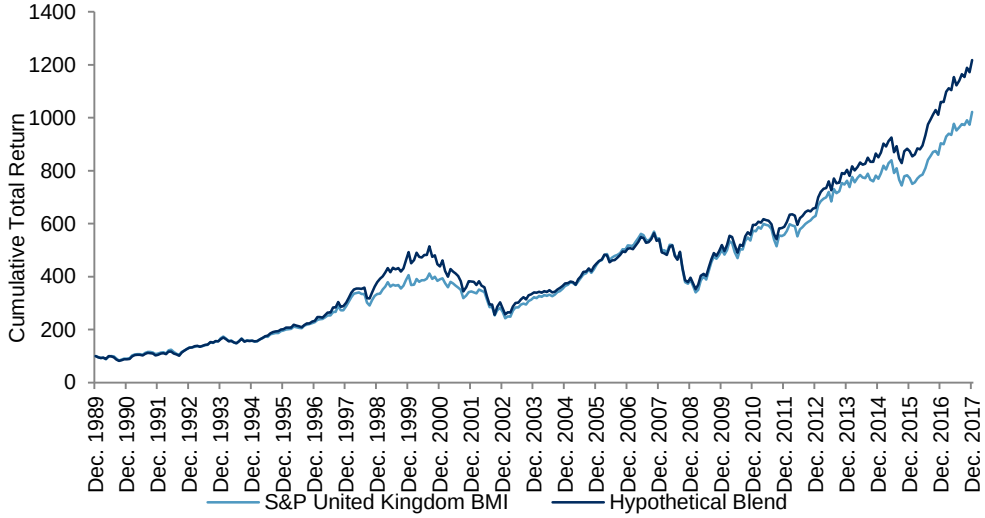
Source: S&P Dow Jones Indices LLC. Data as of December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Thus, if a hypothetical market participant wished to diversify her investments among industries such as internet and direct marketing retail, software, or IT services, she might well include some U.S. companies. Otherwise, she is at risk of ignoring the majority of the investable universe and, potentially, missing out on gains made by a sector globally, but not locally.

It would have taken an uncommon degree of foresight to anticipate (in August 2000) that the information technology sector would fall and subsequently languish in the UK, while its U.S. equivalent would make new highs in the following decades. However, it is not unreasonable to suppose that in August 2000, a UK investor might have wished to diversify across the global information technology sector and considered an allocation to the U.S.[8] Exhibit 5 shows the hypothetical impact a 21% allocation in an investment tracking the S&P 500 Information Technology (in British pound sterling terms) would have made on a portfolio otherwise tracking the S&P United Kingdom BMI.

Diversification limits the risks of missing out on sector gains made globally, but not locally.

Exhibit 5: Potential Impact of Adding the S&P 500 Information Technology to the S&P United Kingdom BMI



Source: S&P Dow Jones Indices LLC. Data as of December 2017. Exhibit 6 shows the potential impact of combining an allocation tracking the S&P United Kingdom BMI with an amount (specifically, 21.1%) tracking the S&P 500 information technology in British pound sterling terms, with the weights determined so that their combination matched—as of August 2000—the S&P Global BMI's 26.5% weight in the information technology sector. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Of course, the results of Exhibit 5 are unique to that particular period and market, and are constructed with significant hindsight bias. On a forward-looking basis, allocations to sectors in foreign markets will always retain the *potential* to hinder returns. But certainly, **sector indices can provide**

[8] As of August 2000, U.S.-domiciled companies composed 73% of the weight of the information technology sector in the S&P Global BMI.

efficient tools to access market segments otherwise underrepresented in local markets.

U.S. sectors demonstrate potentially attractively correlations with each other.

Beyond access to additional sources of potential return, diversification effects are driven by the correlations of a portfolio's constituents. Conveniently, but not coincidentally, different sectors of the same market might have only moderate correlations with each other, as Exhibit 6 demonstrates in the case of the S&P 500.[9]

Correlations between sectors in the same country can be lower than correlations between different countries.

For the past 28 years, there was an average correlation of 0.45 between the monthly total returns of the different sectors, and although some sector pairs have demonstrated correlations as high as 0.84 (consumer discretionary and industrials), **several sector pairs displayed attractively low correlation for diversification purposes**. For example, utilities had relatively low correlations with the majority of other sectors. By way of comparison, the correlation between the monthly total returns of the S&P 500 and the S&P United Kingdom BMI, both expressed in British pound sterling, was 0.74.

Exhibit 6: Correlations Between S&P 500 Sectors

SECTOR	Consumer Discretionary	Consumer Staples	Energy	Financials	Health Care	Industrials	Information Technology	Materials	Telecom-munication Services	Utilities
Consumer Discretionary	1.00	0.56	0.43	0.78	0.52	0.84	0.71	0.73	0.52	0.26
Consumer Staples	-	1.00	0.35	0.58	0.69	0.58	0.30	0.47	0.41	0.44
Energy	-	-	1.00	0.48	0.35	0.58	0.35	0.64	0.33	0.43
Financials	-	-	-	1.00	0.58	0.80	0.52	0.68	0.43	0.34
Health Care	-	-	-	-	1.00	0.56	0.39	0.45	0.40	0.37
Industrials	-	-	-	-	-	1.00	0.66	0.83	0.49	0.37
Information Technology	-	-	-	-	-	-	1.00	0.54	0.47	0.16
Materials	-	-	-	-	-	-	-	1.00	0.39	0.29
Telecom-munication Services	-	-	-	-	-	-	-	-	1.00	0.34
Utilities	-	-	-	-	-	-	-	-	-	1.00

Source: S&P Dow Jones Indices. Data based on monthly total returns from January 1990 to December 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

TRENDS IN U.S. SECTOR INDEX-LINKED PRODUCTS

As we have illustrated, sector- and industry-based benchmarks can provide investors with useful tools for analysis, and U.S. equity sectors may offer a shortcut to achieving diversification objectives. Perhaps in consequence, **an increasing number of market participants have begun using sector-**

[9] Real estate became a GICS sector in September 2016. We therefore omit it from the table due to its relatively short history, from which less meaningful correlation statistics may be drawn.

based index-linked products, such as exchange-listed futures, options, and exchange-traded funds (ETFs)—offered in both the U.S. and abroad.[10]

Among the current range of U.S. sector index-linked products, a significant majority of assets and liquidity have coalesced around the sectors of the S&P 500. This may be due in part to the recognition accorded to the latter as a benchmark, or it may be due to efficiencies in pricing and liquidity that derive from the earlier growth in products linked to the S&P 500 *itself*.[11]

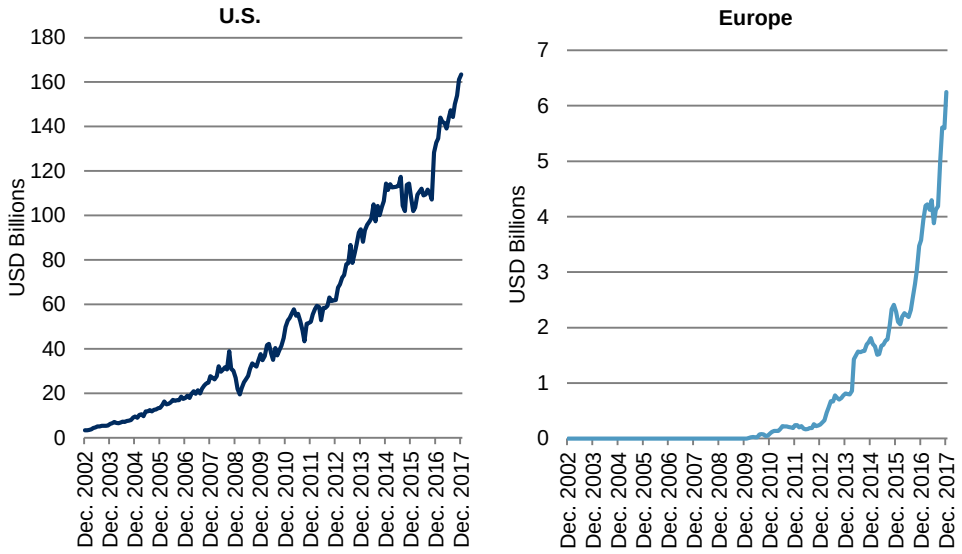
Among the current range of U.S. sector index-linked products, a significant majority of assets and liquidity have coalesced around the sectors of the S&P 500.

Additional sectoral products based on other benchmarks are available. Indeed, for products tracking the more granular industry segments, a broader universe is typically preferred because a sufficiently diversified basket of large-capitalization companies may not be available (see Exhibit 1 and Appendix A).

Focusing on ETFs linked to the sectors of the S&P 500 and the industries of the S&P Total Market Index, Exhibit 7 charts the growth in assets under management (AUM) in U.S.- and European-listed ETFs since December 2002. While noting that the aggregate AUM is much higher in U.S.-listed products than in their European-listed counterparts, the growth rate of the latter has been greater in recent years.

Investors on both sides of the Atlantic are increasingly using U.S. sector-related ETFs

Exhibit 7: Comparison of AUM in U.S.-Listed and Europe-Listed ETFs



Sources: S&P Dow Jones Indices LLC, Reuters. Data as of December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes. For a full list of ETFs included in the calculation of Exhibit 7, please see Appendix B.

The growth and popularity of these products on both sides of the Atlantic may be related to the wide range of potential applications of sector ETFs. Exhibit 8 illustrates some of the more common uses of sectors by U.S.-

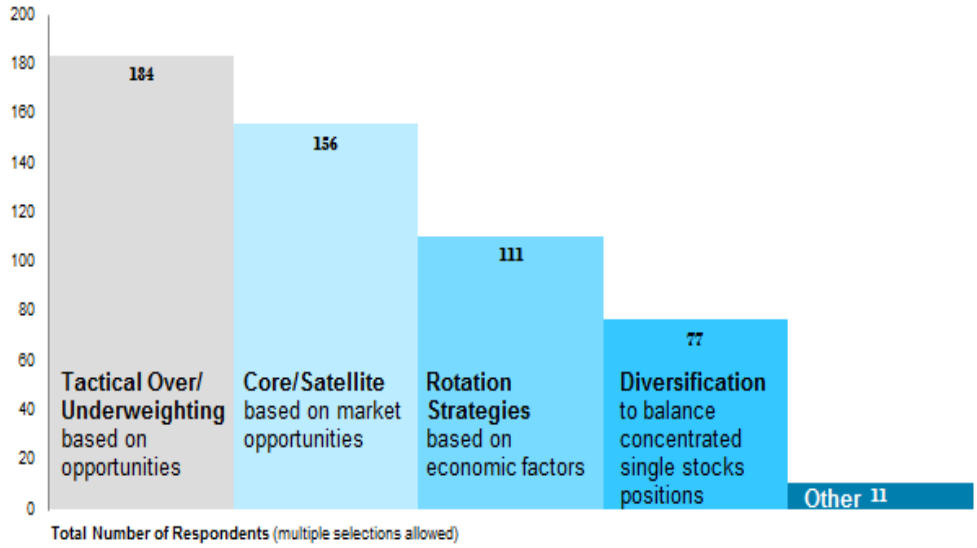
[10] For a full list of products related to S&P Dow Jones Indices sector indices, please see the Related Products Directory. A breakdown of the assets tracking S&P Dow Jones benchmarks may be found in the latest Annual Survey of Indexed Assets.

[11] See Edwards, Tim, Anja Köthe, and Craig J. Lazzara, "Why Does the S&P 500 Matter to the UK?", (September 2016).

based advisors responding to a 2015 survey conducted by one of the major ETF issuers. It is readily apparent that many investors were using sector-related ETFs for tactical, strategic, and diversification purposes, or combinations thereof.

Sector ETFs are used by U.S. advisors for a mix of tactical and strategic purposes.

Exhibit 8: U.S. Advisor Usage of Sector-Related ETFs



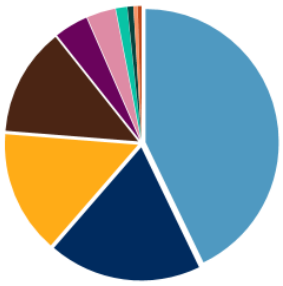
Source: State Street Global Advisors, "Survey of Investment Professionals' Sector and Industry Investing Attitudes and Usage." Data from Q4 2015 to Q1 2016. Chart is provided for illustrative purposes.

European-listed ETFs also show signs of being used for both strategic and tactical purposes.

We may conjecture that ETFs listed elsewhere (or used by other market participants beyond U.S. advisors) would reflect a similarly broad range of usages. Providing support, Exhibit 9 shows the breakdown by sector of the assets in European-listed ETFs at the end of 2017 and as they were at the end of the third quarter of 2016. In absolute terms, technology was a significant component of the total assets at both points, which may be indicative of sector usage for diversification purposes. (Note that here that "technology" combines the GICS telecommunication services sector and the GICS information technology sector, following the particular construction of the relevant ETFs).

Exhibit 9: Breakdown of by Assets of European-Listed S&P 500 Sector-Linked ETFs

December 2017 AUM Breakdown



	December 2017		September 2016		Change (Relative to Cap)
	ETF Assets (%)	Relative to Cap	ETF Assets (%)	Relative to Cap	
Financials	43%	28%	31%	19%	10%
Technology (including Telecommunication Services)	19%	-7%	27%	3%	-10%
Energy	15%	9%	16%	9%	0%
Health Care	13%	-1%	10%	-5%	3%
Industrials	4%	-6%	3%	-6%	0%
Consumer Discretionary	4%	-8%	9%	-3%	-5%
Consumer Staples	1%	-7%	2%	-8%	1%
Real Estate	1%	-2%	0%	-3%	0%
Utilities	1%	-3%	1%	-3%	0%
	0%	-3%	0%	-2%	0%

Source: S&P Dow Jones Indices LLC, Reuters. Data as of December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes. For a full list of ETFs included in the calculation of Exhibit 8, please see Appendix B.

However, **diversification is unlikely to be the sole driver of interest**—in both periods, European investors appear to be *overweight* in financials and energy. These sectors are certainly accessible for European investors in their domestic equity markets (financials was the largest sector in the S&P Europe 350® as of year-end 2017, while energy represented 7%). Further, the magnitude of changes (in relative and absolute terms) of sector weights between the two periods shown in Exhibit 9 is indicative of tactical viewpoints, or at least changing opinions.

In any case, the high volumes observed in sector ETFs[12] suggest that *at least some* investors are using them for somewhat tactical purposes. In part, **this possibility is supported by the potential benefits of using tactical sector allocations in seeking performance-related goals**, as we shall show in the next section.

THE OUTPERFORMANCE POTENTIAL OF TACTICAL SECTOR STRATEGIES

We examine the magnitude of outperformance that might be accessed through timely changes in sectoral allocations.

As Exhibit 3 illustrated, the sectoral composition of a portfolio can, in some instances, appear to be the dominant driver of overall returns, while the availability of sector-based indices has enabled market participants to change their sectoral exposures with relatively greater ease. Naturally, the question arises as to **what impact a different sector mix can make**.

The fundamental issue is the range of sectoral performances, where the statistical measure known as **dispersion** is helpful.[13] The notion underlying the definition of dispersion is illustrated by Exhibit 10, which displays the

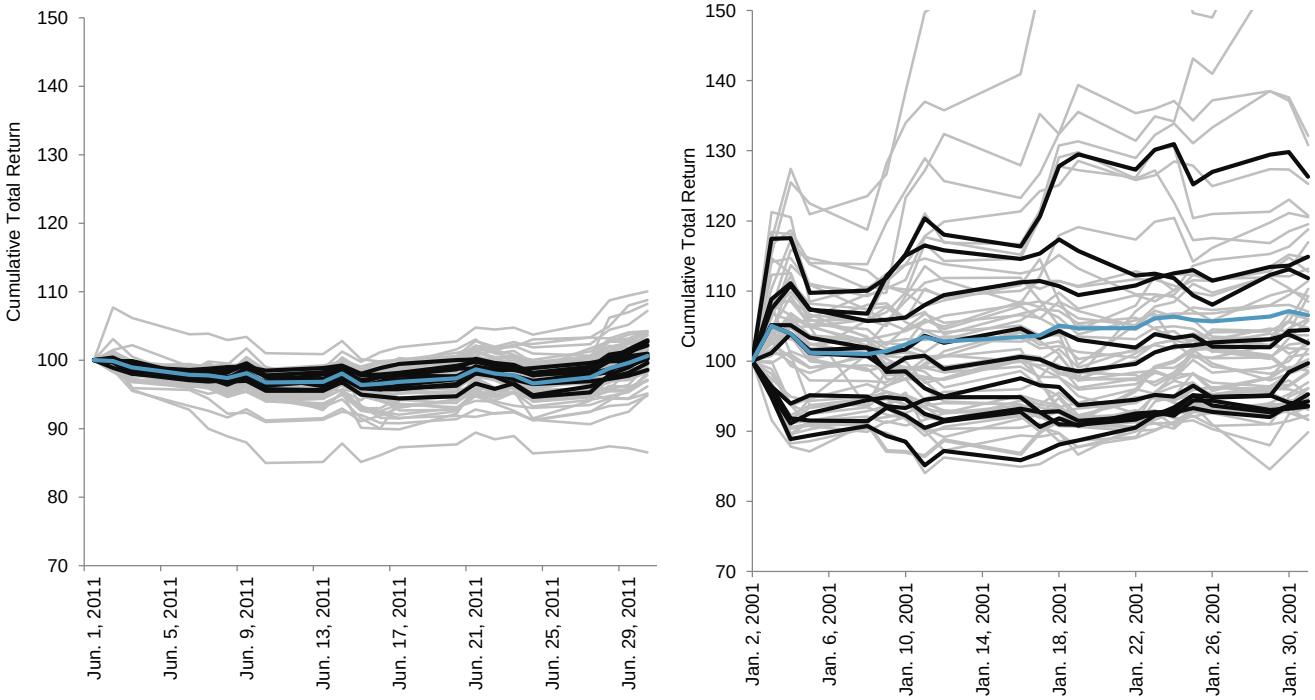
[12] As of December 2017, it was not uncommon for a European-listed ETF tracking an S&P 500 sector to see reported volumes equal to or greater than 10% of outstanding shares in a single day.

[13] Dispersion measures the potential opportunity for outperformance (or embarrassment) that can be expected from selecting particular securities from a given benchmark over a given timeframe. For an introduction to dispersion and some stylized facts regarding its applications and relationships to other risk measures, see Edwards, Tim and Craig J. Lazzara, "Dispersion: Measuring Market Opportunity," December 2013 and "The Landscape of Risk," December 2014.

returns of the benchmark S&P 500 (in blue), along with the performance of the 10 S&P 500 sectors[14] (in black) and the 68 S&P 500 industries (in light grey). The exhibit displays a month of relatively low dispersion (June 2011) and a month of relatively higher dispersion (January 2001).

[14] Real estate became the 11th GICS sector in September 2016.

Exhibit 10: Sector and Industry Performances in January 2001 and June 2011



Source: S&P Dow Jones Indices LLC. Data as of December 2017. Index performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Exhibit 10 illustrates low and high dispersion months for S&P 500 sectors and industries.

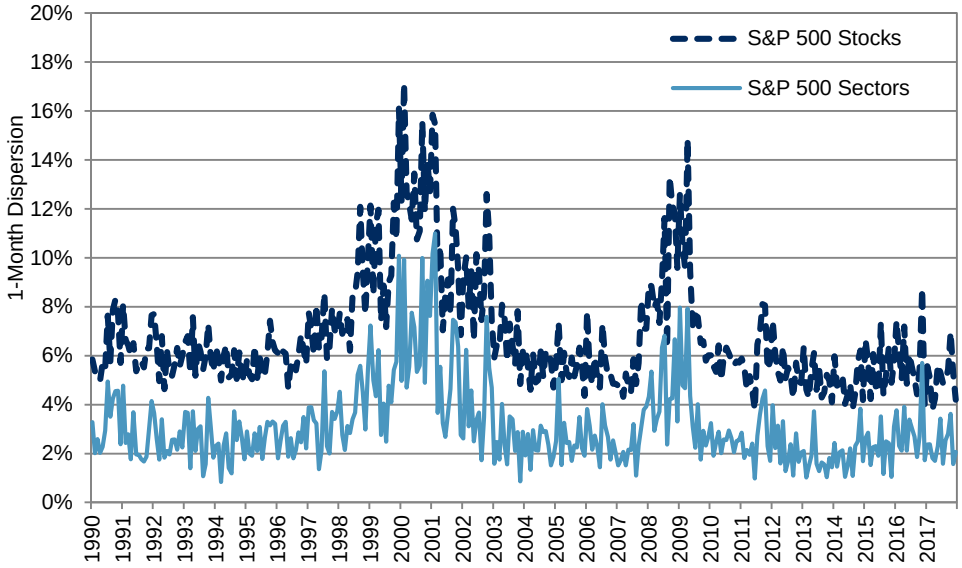
Computationally, we measure dispersion as the (index-weighted) standard deviation of the returns of the sector and industry indices shown in Exhibit 10**.** The measured dispersion was 0.99% for sectors and 2.10% for industries in June 2011 (the left-hand chart in Exhibit 10). In comparison, the stock-level dispersion of the S&P 500's constituents was 3.79% in the same month. Conversely, in January 2001 (the right-hand chart) dispersion was 10.18% for sectors, 12.69% for industries, and 15.85% for stocks. **These dispersion statistics provide a heuristic "value of insight" in respect of selecting stocks, industries, or sectors in each time period**.

Dispersion quantifies the relative value of insight in respect to selecting stocks, industries, or sectors.

Providing a longer-term perspective, Exhibit 11 shows the monthly dispersion of the S&P 500 sectors in comparison to the monthly dispersion measured at the constituent (stock) level. The months identified earlier in the Exhibit 10 may be recognized as near-extreme highs and lows of the historical series.

Nearly half of the rewards available to successful stock-picking strategies could have been derived from successful sector picks instead

Exhibit 11: S&P 500 Stock- and Sector-Level Dispersion (Monthly)



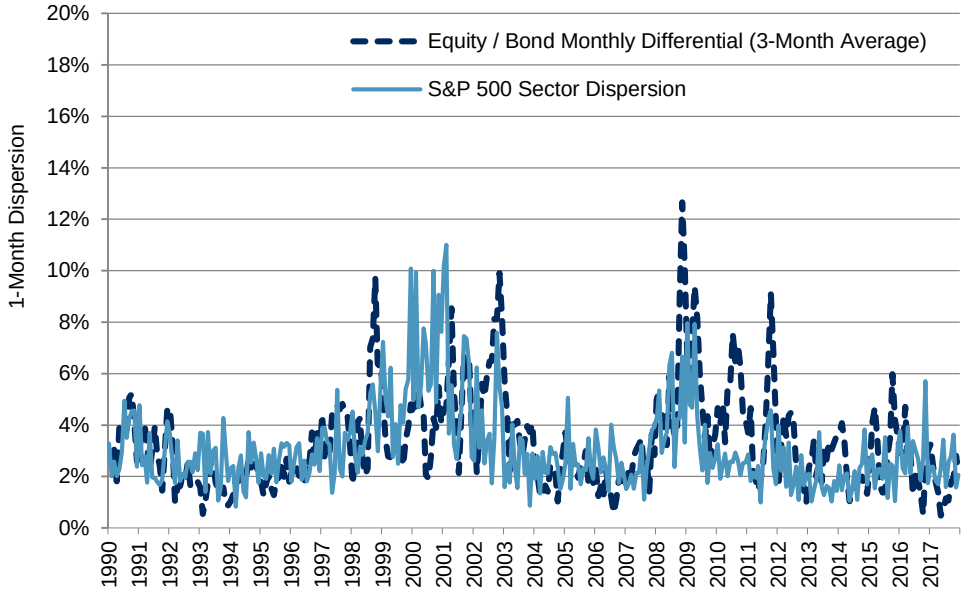
Source: S&P Dow Jones Indices LLC. Data from December 1989 to December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Exhibit 11 suggests that dispersion in sectors may explain a significant proportion of the total dispersion in stocks. To put it in absolute terms, over the period shown in the exhibit, the average level of dispersion in sectors was 3.11%, while the average level of stock dispersion was 6.82%. On average, therefore, **nearly half of the rewards available to successful stock-picking strategies could have been derived from successful sector picks instead**.

Thus, strategies selecting tactically among sectors had a potential for generating outperformance that might be comparable to that of individual stock picking. **What of asset classes?** Exhibit 12 compares the dispersion in S&P 500 sectors to the absolute monthly difference in total returns between the performances of the S&P 500 and the S&P U.S. Treasury Bond Index (and thus, the potential value gained or lost by choosing to track one or the other). The latter series is more "noisy," so a three-month average is taken in order to make a visual comparison clearer.

The potential value of choosing one sector over another was similar to the potential value of switching between equities and bonds.

Exhibit 12: Sector Dispersion Versus Equity/Bond Dispersion



Source: S&P Dow Jones Indices LLC. Data from December 1989 to December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Over the period illustrated in Exhibit 12, there was an average absolute difference of 3.31% between the monthly returns of the S&P 500 and the S&P U.S. Treasury Bond Index, a similar figure to the average dispersion of 3.11% in the S&P 500 sectors. In other words, **the potential value of choosing one sector over another was similar in impact to that of switching between equities and bonds**. Naturally, and as Exhibit 12 illustrates, in some periods the differences in sectoral performances were considerably larger, while in other periods the differential between the bond and equity indices was more significant.

We might quantify the relative impact of each of sector, stock, and asset class changes on an overall portfolio with an example. Suppose that a hypothetical portfolio tracks an allocation of 60% in the S&P 500 and the remaining 40% in the S&P U.S. Treasury Bond Index. Such a portfolio would have an average of 0.12% invested in each company in the S&P 500, and an average of 5.45% in each of the 11 S&P 500 sectors. Suppose further that we anticipate a continuation of the historical 3.31% difference between bond and equity returns in any given month, as well as a monthly dispersion of S&P 500 stocks and sectors equal to their averages since 1990—that is to say 6.82% and 3.11%, respectively. Then, replacing one stock with another would be expected to have an impact on returns equal to around 0.008% per month, calculated by multiplying the average single-stock weight of 0.12% by the stock dispersion of 6.82%. In comparison, replacing one sector with another would be expected to have an impact of 0.17%; while changing the bond/equity allocation by 5% in either direction would also be expected to have an equal 0.17% impact.

While we have focused on the potential impact of selecting favorites among sectors or industries, note that the **scale of such opportunities is in direct proportion to their potential for diversification**. If some sectors rise while others fall, their combination will typically offer a smoother ride.[15]

EXPRESSING MACRO VIEWS WITH SECTORS

Tactical strategies based on sectors have a long history and maintain a significant following.

Strategies that convert forecasts or trends in broader market variables into preferences for certain equity sectors have a long history. Inputs can range from the broad and infrequently published, to the highly granular and near-instantaneous. They may be based on public data or derived from a privately researched "house view." The common feature of such strategies is that they draw inferences about future sectoral performances from a broader viewpoint and allocate through the use of sector-based products.

Sector and industry groupings link macro-level signals to their market effects.

But why choose sector- or industry-based approaches, as opposed to individual companies or other groupings of companies? Why use sector rotation strategies instead of, say, switching between equities and bonds? Up to a point, the remarks of the previous section apply: insights regarding sectors have a value commensurate to those of insights regarding different asset classes or different stocks. However, the key point is that the grouping of companies into sectors and industries acts to **link macro-level signals to their market effects**. Each *individual* company faces risks that are unique to its particular circumstances, as well as those risks shared by its peers. Forming portfolios of securities from peer groups has the effect of **mitigating exposures to individual risks while preserving common sensitivities**. Since the classifications of stocks into industries and sectors serves to group those companies operating in similar spheres (and thus exposed to similar risks), **a sectoral perspective is entirely natural when implementing views on broader trends**.

High correlations may be found between macro data and sectoral performances.

We note in passing that some managers may believe they can successfully pick both industries *and* stocks within industries; some who believe it may even be able to do it. But it is worth remembering that **the level of dispersion among stocks within some *sectors* is so low as to suggest that the time might be better spent on other matters**.[16]

Certainly, high correlations may be found between macroeconomic data and sectoral performances. Exhibit 13 demonstrates some of the historical relationships that may be observed between selected data series and the *relative* performance of various sectors and industries. In each case, we examined the one-year rolling percentage change, absolute change or average level in a publicly available statistic and compared it to the relative one-year rolling return of various pairs of sector and industry

[15] See Edwards, Tim and Craig J. Lazzara, "At the Intersection of Diversification, Volatility and Correlation," April 2014.

[16] See Bennett, Chris and Craig J. Lazzara, "Some Implications of Sector Dispersion," April 2015.

indices of the S&P 500. Allowing for cases where the equity markets may lead (or lag) changes in the related statistic, the final column of Exhibit 13 shows the lag or lead (in quarters) required in order to display the highest correlation. A negative value indicates that the sector indices "led," while a positive value indicates they "lagged."

Exhibit 13: Correlations Between Sector & Industry Returns and Changes in Broader Data

STATISTIC	INDEX	RELATIVE TO	CORRELATION	TIMING
S&P GSCI (% Change)	Energy Equipment & Services	Food & Staples Retailing	0.77	Coincident
U.S. Unemployment Rate (Absolute Change)	Consumer Staples	Financials	0.56	Leading (-3)
Initial Unemployment Claims (Absolute Change)	Consumer Staples	Industrials	0.55	Coincident
U.S. Consumer Inflation (Average Level)	Energy	Consumer Discretionary	0.74	Leading (-2)
VIX® (Absolute Change)	Food & Staples Retailing	Building Products	0.56	Coincident
NYSE Member Firms Debit Balances in Margin Accounts (% Change)	S&P 500	Consumer Staples	0.77	Coincident
U.S. Nominal GDP Growth (% Change)	S&P 500	Consumer Staples	0.58	Leading (-3)
10-Year U.S. Treasury Yield (% Change)	Industrials	Utilities	0.54	Coincident
S&P 500 12M Dividend Yield (% Change)	Consumer Staples	Financials	0.68	Coincident
10-Year-2-Year U.S. Treasury Yields (Average Level)	Banks	Diversified Financial Services	0.50	Leading (-2)

Source: U.S. Bureau of Labor Statistics, U.S. Department of Labor, NYSE, U.S. Bureau of Economic Analysis, Board of Governors of the Federal Reserve System, S&P Dow Jones Indices LLC. Data from December 1989 to December 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

Insights into future trends have the potential to guide successful sector strategies.

More often than not, equity sectors appear to be *leading* or coincident indicators of the broader data. Thus, **insights into future trends in top-level economic data have the potential to guide successful sector strategies.**

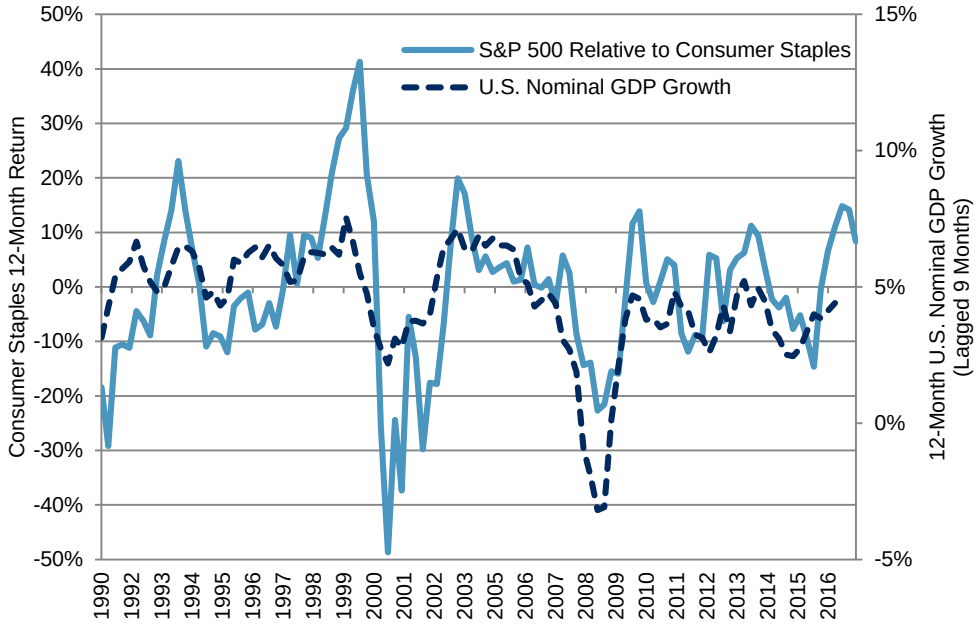
For example, consider the 0.58 correlation shown in Exhibit 13 between U.S. GDP and the relative performance (three quarters in advance) of the S&P 500 over the S&P 500 Consumer Staples sector. That some degree of correspondence should exist between the two series is intuitive. **Companies in the consumer staples sector are likely to do *relatively* better during a slowdown in the economy as consumers prioritize purchases of necessities**. Since changes in consumer behavior can take time to trickle through into economic growth figures and since—in the meantime—**better-informed market participants can trade in advance**, we might expect the sector's relative returns to anticipate a slowdown well before it is reported in GDP figures.[17]

[17] And also to provide false alarms, as in the famous observation—attributed to Paul Samuelson—that "the stock market has forecast nine of the last five recessions."

Exhibit 15 illustrates the correspondence between the two series. In particular, the first (solid line) series of Exhibit 14 plots the one-year excess total return of the S&P 500, taken relative to the S&P 500 Consumer Staples and measured quarterly. The second (dotted line) series of Exhibit 14 plots the one-year change in the U.S. nominal GDP, plotted nine months in advance. The two series appear to relate to each other quite closely.

The relative performance of consumer staples appear to offer a prediction of GDP growth, nine months in advance.

Exhibit 14: U.S. Nominal GDP Growth and S&P 500 Relative to Consumer Staples Total Returns (Lagged)



Source: S&P Dow Jones Indices LLC, U.S. Bureau of Economic Analysis. Data as of December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Naturally, if one had accurate forecasts of future top-line economic growth rates then, according to Exhibit 14, that information might have driven a preference for overweighting or underweighting the consumer staples sector.

SECTORS AND THE ECONOMIC CYCLE

Suppose we were provided with an accurate forecast of future GDP trends. Would it be more beneficial to rotate among sectors, or between asset classes? Beyond inclusion or exclusion of consumer staples, **further sectoral choices are available**, which raises the question as to which sectors might be appropriate in periods when economic growth was above or below trend.

Statistical correlations, volatility and beta offer a way to distinguish "defensive" and "expansionary" sectors

In identifying sectors better suited to periods of lower growth, or sectors better suited to expansions, an obvious statistic to measure is the **correlation** of each sector's returns to GDP growth at the time. An investor might also consider a sector's **volatility**, assuming higher risk to be rewarded in expansions, and the sector's **market beta**, assuming market risk is better rewarded than more diversifiable risks.

Not all sectors can be easily characterized as definitively "expansionary" or "defensive" on these three measures alone, but if permitted discretion, we might produce a table such as Exhibit 15. This table selects three "expansionary" and three "defensive" sectors and displays the associated statistics, as well as those for the sectors unselected in either category.

Exhibit 15: Potential Classification of Sectors

SECTOR	CORRELATION TO GDP (QUARTERLY)	BETA TO S&P 500 (QUARTERLY)	ANNUAL VOLATILITY (MONTHLY, %)
DEFENSIVE SECTORS			
Consumer Staples	-0.08	0.56	13.0
Health Care	-0.07	0.69	15.3
Utilities	0.16	0.58	14.8
EXPANSIONARY SECTORS			
Financials	0.06	1.20	21.3
Information Technology	0.14	1.53	24.4
Telecommunication Services	0.14	1.12	18.9
EXCLUDED			
Energy	-0.02	0.65	18.2
Industrials	-0.08	1.00	16.8
Materials	-0.18	0.81	19.5
Consumer Discretionary	-0.08	1.03	17.2

Source: S&P Dow Jones Indices LLC, U.S. Bureau of Economic Analysis. Data as of Dec. 29, 2017. Index performance based on total return in USD from 1990 to 2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes. Financials includes real estate prior to September 2016. Individual statistics for the real estate sector are not shown, due to the limited time period for which it has been a top-level sector.

Unavoidably, **this classification *is* subjective**: due to its low volatility and low market beta, utilities is placed in the defensive category despite its positive correlation to changes in GDP. Meanwhile, even though the four excluded sectors display negative GDP correlations, their higher levels of volatility and/or market beta give grounds to exclude them from either category. **Different classifications will produce different implementations, but we must start somewhere** and, with such a classification in hand, we can now examine the relative impact of sector allocations compared to an asset-class-based alternative.

We can now examine the relative impact of sector allocations, compared to an asset-class-based alternative.

SECTOR VERSUS ASSET ROTATION: AN EXAMPLE

In order to illustrate the relative "power" of implementing forecasts either by selecting sectors within equities, or by switching between equities and bonds, we compare the performance of two hypothetical investment strategies. The two strategies were *not* designed to optimize their ex-post statistics, but instead to be broadly indicative of the relative merits of sector- or asset-class-based approaches. In both cases, we assume we are provided with information on whether GDP growth in subsequent quarters would be above or below the median for the period, and we allow for an equal degree of turnover in response to a change in the signal.

The "**asset rotation**" portfolio tracks various combinations of the S&P 500 and the S&P U.S. Treasury Bond Index, potentially switching 20% at the end of each quarter according to whether the next quarter will display above or below median GDP growth. The hypothetical strategy prescribes tracking a 70/30 ratio between equities and bonds in quarters during which GDP growth turned out to be above median, and a 50/50 ratio otherwise. Exhibit 16 extends the rows of Exhibit 15 to include the two additional indices and a traditional "benchmark" combination.

Exhibit 16: Bond and Equity Index Statistics

ASSET CLASSES	CORRELATION TO GDP (QUARTERLY)	BETA TO S&P 500 (QUARTERLY)	ANNUAL VOLATILITY (MONTHLY, %)
S&P 500	0.10	1.00	14.2
S&P U.S. Treasury Bond Index	-0.04	-0.02	3.7
Benchmark 60/40 Portfolio	**0.09**	**0.59**	**8.5**

Source: S&P Dow Jones Indices LLC, U.S. Bureau of Economic Analysis. Data from January 1990 to December 2017. Index performance based on total returns in USD over the period 1990-2017. Past performance is no guarantee of future results. Table is provided for illustrative purposes.

The second hypothetical investment strategy, which we call "**sector rotation**," involves tracking a constant 40% weight in the S&P 500 and 40% in the S&P U.S. Treasury Bond Index. The final 20% tracks alternatively (an equal-weight mix of) expansionary, or defensive sectors as selected in Exhibit 15. Exhibit 17 summarizes the possible portfolio allocations of the two hypothetical strategies.

Both asset and sector strategies rely on the same signal, have the same turnover, and have similar average positions.

Exhibit 17: Hypothetical Asset Rotation and Sector Rotation Strategies

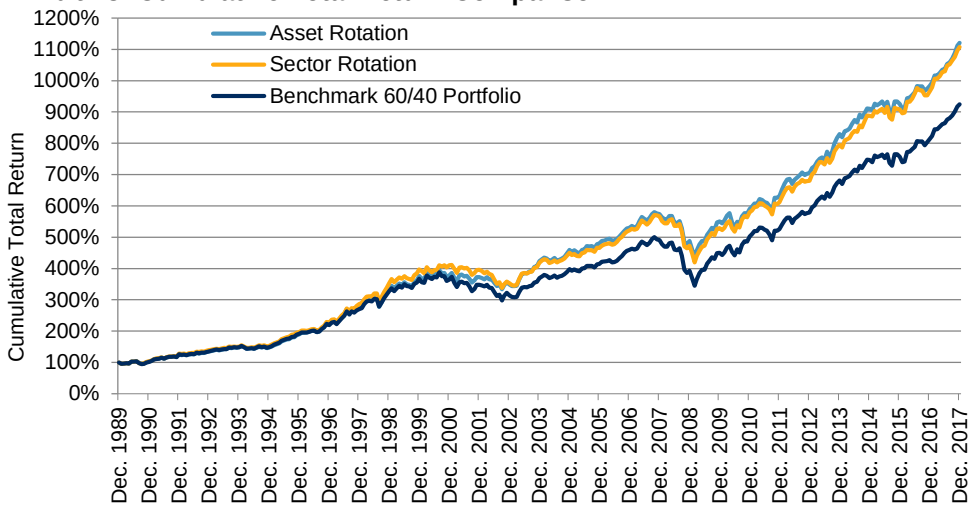
PORTFOLIO	TACTICAL ALLOCATION	BOND ALLOCATION (%)	EQUITY ALLOCATION (%)
Asset Rotation (*Defensive*)	20% in Bonds	30-50	50-70
Asset Rotation (*Expansionary*)	20% in Equities		
Sector Rotation (*Defensive*)	20% in Defensive Sectors	40	60
Sector Rotation (*Expansionary*)	20% in Expansionary Sectors		

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Thus, **both strategies rely on the same signal, require an identical degree of turnover in switching between one portfolio and the other, and maintain an average position approximating that of a benchmark portfolio allocated 60% in equities and 40% in bonds**.[18] Accordingly, Exhibits 18 and 19 compare various hypothetical performance statistics for the two strategies.

[18] By using *median* GDP growth as the dividing line, our portfolios are evenly split over time between expansionary and defensive allocations.

Exhibit 18: Cumulative Total Return Comparison



Source: S&P Dow Jones Indices LLC. Data as of December 2017. Performance based on total return in USD. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Sector- and asset-rotation strategies offered similar performance enhancement

Exhibit 19: Summary Statistics Comparison

PORTFOLIO	TOTAL RETURN (%)	EXCESS RETURN (%)	VOLATILITY (%)	TRACKING ERROR (%)	SHARPE RATIO	INFORMATION RATIO
Benchmark 60/40 Portfolio	14.00	0	8.50	0	1.6	NA
Asset Rotation	15.30	1.22	8.02	1.50	**1.9**	**0.7**
Sector Rotation	15.50	1.50	8.23	1.80	**1.9**	**0.9**

Source: S&P Dow Jones Indices LLC. Performance based on total return in USD. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosure at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

At the risk of stating the obvious, this example only scratches the surface of the more general question of when asset class rotation or sector rotation strategies will offer a more effective way to implement a broader investment view. In the real world, a host of other considerations, such as transaction costs, will play a part in determining which implementation is preferable for a given market participant. But it does show that **sector rotation strategies can sometimes offer a similar level of effectiveness**.

The sectoral makeup of markets changed over time; the indices changed too.

CHANGES IN SECTORS AND INDUSTRIES

When seeking to build a broader market representation than that offered by his earlier Transportation Average, Charles Dow opted in 1896 to select one company from each of 12 representative market segments. At the time, his new “Industrial Average” was a novel representation of the overall market.

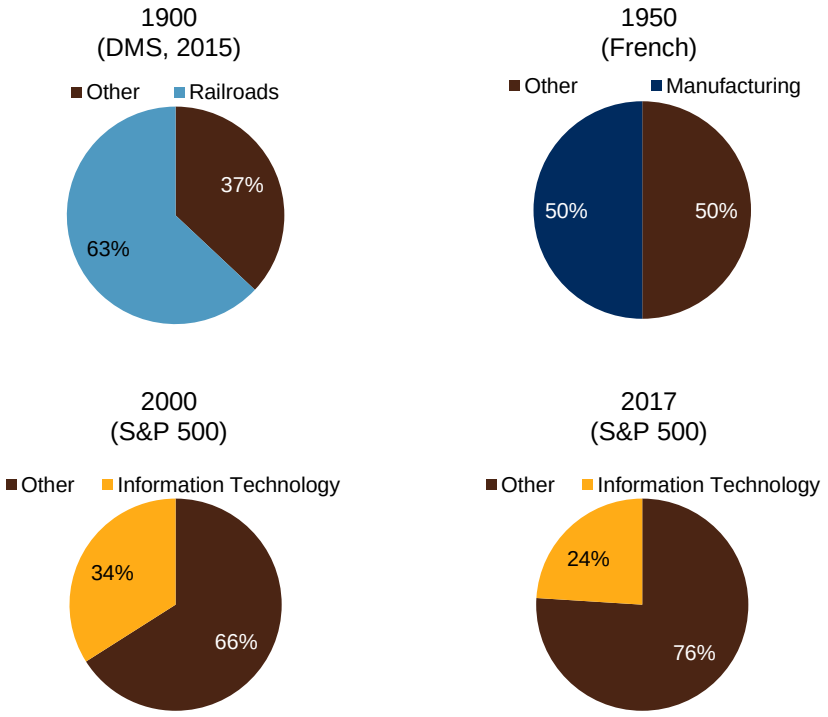
Subsequent economic developments, including the emergence of companies in new sectors, mean that **by modern standards, the first constituents of the Dow only represented one sector of what later**

became many. Today the Dow only contains one company in the industrials sector (General Electric—an original member), combined with 29 other names representing another nine GICS sectors.

As companies, markets, and industries change, the classification of each company and the sectoral compositions of markets change with them. Exhibit 20 illustrates the change in the makeup of the U.S. market over the past century, using various data sources for each period. (We are not aware of a single data source that allows for direct comparisons over the entire period.) The largest market segment in 1900, by a significant margin, was railroads, which were 63% of the total U.S. equity market capitalization.[19] By 1950, railroads had been overtaken by manufacturing, which then represented the largest piece and accounted for 43% of the market.[20] More recently, at the peak of the tech bubble in August 2000, information technology represented 34% of the S&P 500's capitalization. Today the largest sector remains information technology, but it accounted for only 24% of the total at the end of 2017.

Railroads are only a "sub-industry" today, but they constituted more than half the U.S. market in 1900.

Exhibit 20: Comparing Sectoral Compositions



Source: S&P Dow Jones Indices LLC. Data from August 2000 and December 2017 based on corresponding sector weights in the S&P 500. Data from January 1950 is based on Kenneth French's 5 Industry Portfolios for all U.S.-listed stocks. Data for 1900 is based on the Dimson, Marsh, and Staunton database. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

[19] Dimson, Elroy, Paul Marsh, and Mike Staunton; "Industries: Their rise and fall," Credit Suisse Global Investment Returns Yearbook, (2015).

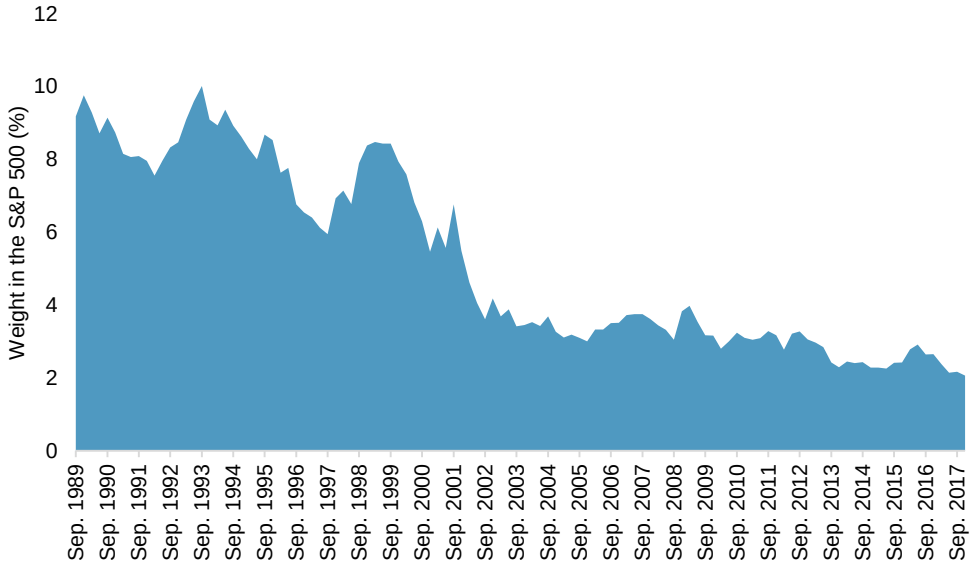
[20] Data based on five industry portfolios. For further details, please see Kenneth French's Data Library.

If, in 1900, we were building a new classification system for sectors and industries of the U.S. market, the fact that railroads were 63% of the entire equity capitalization would suggest that they should define one or even two top-level classifications (East Coast and West Coast, perhaps). Today, railroads represent less than 1% of the S&P Total Market Index, and they are at the lowest level of the GICS classification system (see Exhibit 1).

A similar, albeit slightly less extreme, decline has been observed more recently in the telecommunication services sector—Exhibit 21 shows the decline in the sector's weight in the S&P 500 from 9% in December 1989 to just over 2% at the end of 2017. Combined with a stock count reduction from 11 to 3 over the same period, which increased the potential for idiosyncratic risks to drive the sector's returns, many market participants have chosen to combine the sector with others. For instance, the "select" series of sector indices combines telecommunication services and information technology. (We provide a summary list of such indices, and the ETFs based on them, in Appendix B.)

The decline of the telecommunication services sector offers a more recent example of an industry that no longer holds its previous significance.

Exhibit 21: The Decline of the Telecommunication Services Sector Weight in the S&P 500



Source: S&P Dow Jones Indices LLC. Data based on quarterly data from September 1989 to December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

Arithmetically speaking, declines in the weights of certain market segments mean that other areas must grow. Sometimes, an existing industry may grow sufficiently so as to be recognized as a top-level sector, as in the case of real estate, which became a GICS sector in September 2016.[21] Alternatively, it may be more effective to regroup existing companies together in a newly defined sector or industry. At the time of

[21] For more details, please see "S&P Dow Jones Indices and MSCI Revisions to the Global Industry Classification Standard (GICS®) Structure," March 8, 2016.

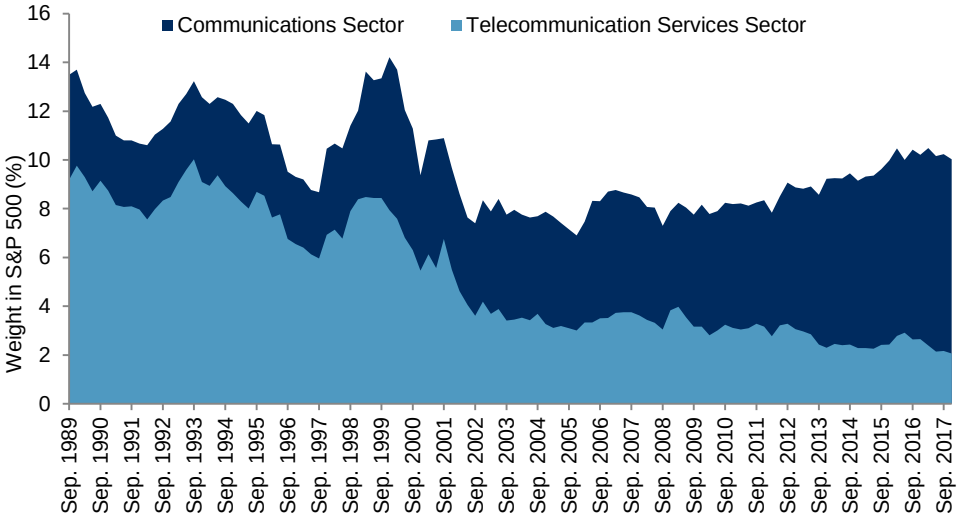
"Communications" is currently slated to become a new GICS sector.

publication, **market participants are anticipating the creation of a new "communications" GICS sector in September 2018**. This new sector will contain the existing telecommunication services sector together with industry groups and sub-industries broadly engaged in business activities associated with entertainment content, media, and communications. The exact details of the new sector are under review, but based on the November 2017 public announcement,[22] it is anticipated that the media industry group, the internet software & services sub-industry, and the home entertainment software sub-industry will be added to the telecommunication services sector to form the new segment.

Assuming that the end result is in line with current expectations, Exhibit 22 demonstrates the hypothetical historical weight that the new S&P 500 communications sector would have maintained. On average, communications would have represented a 10% weight in the S&P 500 (the contribution from telecommunication services is highlighted for purposes of comparison).

Communications would have represented a 10% weight in the S&P 500.

Exhibit 22: Pro-Forma Historical (Hypothetical) Weight of the Communications Sector in the S&P 500



Source: S&P Dow Jones Indices LLC. Data based on quarterly data from September 1989 to December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

While the sectoral composition of markets has indeed varied over time, it is worth putting such changes in context. For example, S&P Dow Jones Indices also splits the constituents of the S&P 500 into "growth" and "value" categories on an annual basis in order to produce growth and value indices. In comparison to value or growth characteristics,[23] sectoral classifications have been extremely stable. Indeed, Exhibit 23 shows that since

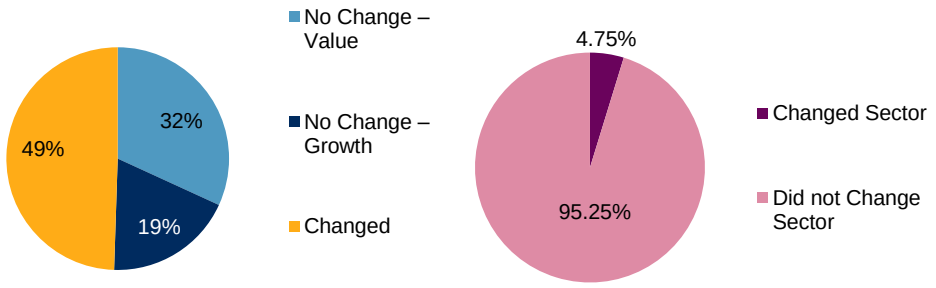
[22] For more information, please see this joint announcement by S&P Dow Jones Indices and MSCI.

[23] A value company is considered to be one with more than 50% of its S&P 500 weight in the S&P 500 Value. If a company has 50% or more of its S&P 500 weight in the S&P 500 Growth, it is considered a growth company.

December 1996, of the more than 1,500 companies to have been constituents of the S&P 500, **49% changed between value and growth classifications at least once**. **Only 4.75% of these companies changed sector classification over the same period.** Taken together, these results offer a final reassurance that the way companies have been grouped by the GICS system is sensible and based on characteristics that are not subject to frequent change.

Sector classifications were considerably more stable than style classifications.

Exhibit 23: Changes in Classifications for the S&P 500 Constituents



Source: S&P Dow Jones Indices LLC. Data from December 1996 to December 2017. Past performance is no guarantee of future results. Chart is provided for illustrative purposes.

CONCLUSION

For more than a century, market participants and commentators have grouped the performances of stocks together with those of their peers, forming indices whose fluctuations can reveal the principal components driving returns and dampen the noise of individual narratives. Sector-based investing is not new, nor is the analysis of portfolios through industry lenses. Both have a long history and remain a fundamental part of the modern investment landscape.

There are good grounds for the popularity of sector-based approaches. Sectoral indices and their weighted combinations offer convenient yardsticks to judge the success or failure of a single stock or a single investment manager, while the ability of sector and industry-based portfolios to capture the impact of broader trends efficiently makes them potentially attractive building blocks for investment strategies.

What *is* new is the increased availability of products offering market participants more efficient tools to implement their investment views in sectors and industries. An active approach is not required for an interest in sectors: a sectoral perspective can help passive investors to understand their benchmark's returns, risks, and biases. However, for those investors who wish to take an active approach, a sector-based implementation can efficiently connect broader investment themes to their market effects.

APPENDIX A

Exhibit 24: GICS and Select Sector Taxonomy

TYPE OF SECTOR INDICES	WEIGHTING SCHEME	CONSTITUENT UNIVERSE	CLASSIFICATION BY
S&P 500 Sector Indices	Cap Weight	S&P 500	GICS Sectors
S&P 500 Equal Weight Sector Indices	Equal Weight	S&P 500	GICS Sectors
S&P U.S. Select Sector Indices (Select, Select 20% Capped, and Select 35%/20% Capped Indices)	Modified Cap Weight[1]	S&P 500	GICS Sectors, (excluding Telecommunication Services[2])
U.S. Select Industry Indices	Modified Equal Weight[3]	S&P Total Market Index	GICS Sub-Industry, Industry, or Industry Group

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

[1] The select sector indices are essentially market-capitalization-weighted, but with adjustments to limit potential concentrations. The "select" methodology aims to ensure that no stock is greater than around 25% of the total weight, and that the top 10 positions comprise no more than 50%. The "capped 20%" methodology removes the latter condition but tightens the first to a cap of 20%, while the "capped 35%/20%" methodology requires all weights excluding the largest to be below 20%, with the largest capped at 35%.

[2] The select sector and select 20% capped sector indices combine telecommunication services and information technology into a combined technology sector, while the select 35%/20% capped sector indices offer a combined telecommunications services and utilities sector.

[3] The select industry indices typically include at least 35 or more constituents selected from the relevant S&P Total Market Index sub-industry, subject to additional size and liquidity criteria. The constituents are equally weighted, with modifications to reduce the weight in stocks breaching minimum liquidity criteria.

Full details are available via the S&P U.S. Indices Methodology and the S&P Select Industry Methodology.

APPENDIX B

Exhibit 25: ETFs Used in Constructing Exhibits 7 and 9

EUROPEAN-LISTED ETFS

TICKER	ETF	INDEX
IUCD	iShares S&P 500 Consumer Discretionary Sector UCITS ETF	S&P 500 Capped 35/20 Consumer Discretionary Index
IUCS	iShares S&P 500 Consumer Staples Sector UCITS ETF	S&P 500 Capped 35/20 Consumer Staples Index
IUES	iShares S&P 500 Energy Sector UCITS ETF	S&P 500 Capped 35/20 Energy Index
IUFS	iShares S&P 500 Financials Sector UCITS ETF	S&P 500 Capped 35/20 Financials Index
IUHC	iShares S&P 500 Health Care Sector UCITS ETF	S&P 500 Capped 35/20 Health Care Index
IUIS	iShares S&P 500 Industrials Sector UCITS ETF	S&P 500 Capped 35/20 Industrials Index
IUIT	iShares S&P 500 Information Technology Sector UCITS ETF	S&P 500 Capped 35/20 Information Technology Index
IUMS	iShares S&P 500 Materials Sector UCITS ETF	S&P 500 Capped 35/20 Materials Index
IUUS	iShares S&P 500 Utilities Sector UCITS ETF	S&P 500 Capped 35/20 Utilities Index
XLYS	Source S&P Consumer Discretionary Select Sector UCITS ETF	S&P Select Sector Capped 20% Consumer Discretionary Index
XLPS	Source S&P Consumer Staples Select Sector UCITS ETF	S&P Select Sector Capped 20% Consumer Staples Index
XLES	Source S&P Energy Select Sector UCITS ETF	S&P Select Sector Capped 20% Energy Index
XLFS	Source S&P Financials Select Sector UCITS ETF	S&P Select Sector Capped 20% Financials Index
XLVS	Source S&P Health Care Select Sector UCITS ETF	S&P Select Sector Capped 20% Health Care Index
XLIS	Source S&P Industrials Select Sector UCITS ETF	S&P Select Sector Capped 20% Industrials Index
XLBS	Source S&P Materials Select Sector UCITS ETF	S&P Select Sector Capped 20% Materials Index
XRES	Source S&P Real Estate Select Sector UCITS ETF	S&P Select Sector Capped 20% Real Estate Index
XLKS	Source S&P Technology Select Sector UCITS ETF	S&P Select Sector Capped 20% Technology Index
XLUS	Source S&P Utilities Select Sector UCITS ETF	S&P Select Sector Capped 20% Utilities Index
SXLY	SPDR® S&P® U.S. Consumer Discretionary Select Sector UCITS ETF	Consumer Discretionary Select Sector Index
SXLP	SPDR® S&P® U.S. Consumer Staples Select Sector UCITS ETF	Consumer Staples Select Sector Index
SXLE	SPDR® S&P® U.S. Energy Select Sector UCITS ETF	Energy Select Sector Index
SXLF	SPDR® S&P® U.S. Financials Select Sector UCITS ETF	Financials Select Sector Index
SXLV	SPDR® S&P® U.S. Health Care Select Sector UCITS ETF	Health Care Select Sector Index
SXLI	SPDR® S&P® U.S. Industrials Select Sector UCITS ETF	Industrials Select Sector Index
SXLB	SPDR® S&P® U.S. Materials Select Sector UCITS ETF	Materials Select Sector Index
SXLK	SPDR® S&P® U.S. Technology Select Sector UCITS ETF	Technology Select Sector Index
SXLU	SPDR® S&P® U.S. Utilities Select Sector UCITS ETF	Utilities Select Sector Index

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Exhibit 25: ETFs Used in Constructing Exhibits 7 and 9 (cont.)

U.S.-LISTED ETFS

TICKER	ETF	INDEX
XLY	SPDR - Consumer Discretionary Select Sector ETF	Consumer Discretionary Select Sector Index
XLP	SPDR - Consumer Staples Select Sector ETF	Consumer Staples Select Sector Index
XLE	SPDR - Energy Select Sector Fund	Energy Select Sector Index
XLF	SPDR - Financials Select Sector Fund	Financials Select Sector Index
XLV	SPDR - Health Care Select Sector Fund	Health Care Select Sector Index
XLI	SPDR - Industrials Select Sector Fund	Industrials Select Sector Index
XLB	SPDR - Materials Select Sector Fund	Materials Select Sector Index
XTH	SPDR - S&P Technology Hardware ETF	S&P Technology Hardware Select Industry Index
XHE	SPDR - S&P Health Care Equipment ETF	S&P Health Care Equipment Select Industry Index
XWEB	SPDR - S&P Internet ETF	S&P Internet Select Industry Index
XME	SPDR - S&P Metals & Mining ETF	S&P Internet Select Industry Index
XLRE	SPDR - S&P Real Estate Select Sector ETF	Real Estate Select Sector Index
XSW	SPDR - S&P Software & Services ETF	S&P Software & Services Select Industry Index
XTL	SPDR - S&P Telecom ETF	S&P Telecom Select Industry Index
XLK	SPDR - Technology Select Sector Fund	Technology Select Sector Index
XLU	SPDR - Utilities Select Sector Fund	Utilities Select Sector Index
KBE	SPDR S&P Bank ETF	S&P Banks Select Industry Index
XBI	SPDR S&P Biotechnology ETF	S&P Biotechnology Select Industry Index
KCE	SPDR S&P Capital Markets ETF	S&P Capital Markets Select Industry Index
XHS	SPDR S&P Health Care Services	S&P Health Care Services Select Industry Index (TR)
XHB	SPDR S&P Homebuilders ETF	S&P Homebuilders Select Industry Index
KIE	SPDR S&P Insurance ETF	S&P Insurance Select Industry Index
XES	SPDR S&P Oil & Gas Equipment & Services ETF	S&P Oil & Gas Equipment & Services Select Industry Index
XOP	SPDR S&P Oil & Gas Exploration & Production ETF	S&P Oil & Gas Exploration & Production Select Industry Index
XPH	SPDR S&P Pharmaceuticals ETF	S&P Pharmaceuticals Select Industry Index
KRE	SPDR S&P Regional Banks ETF	S&P Regional Banks Select Industry Index
XRT	SPDR S&P Retail ETF	S&P Retail Select Industry Index
XSD	SPDR S&P Semiconductor ETF	S&P Semiconductor Select Industry Index
XTN	SPDR S&P Transportation ETF	S&P Transportation Select Industry Index
RCD	Guggenheim S&P 500 Consumer Discretionary ETF	S&P 500 Equal Weight Consumer Discretionary
RHS	Guggenheim S&P 500 Consumer Staples ETF	S&P 500 Equal Weight Consumer Staples
RYE	Guggenheim S&P 500 Energy ETF	S&P 500 Equal Weight Energy
RYF	Guggenheim S&P 500 Financials ETF	S&P 500 Equal Weight Financials
RYH	Guggenheim S&P 500 Health Care ETF	S&P 500 Equal Weight Health Care
RGI	Guggenheim S&P 500 Industrials ETF	S&P 500 Equal Weight Industrials
RTM	Guggenheim S&P 500 Materials ETF	S&P 500 Equal Weight Materials
EWRE	Guggenheim S&P 500 Real Estate ETF	S&P 500 Equal Weight Real Estate
RYT	Guggenheim S&P 500 Technology ETF	S&P 500 Equal Weight Technology
RYU	Guggenheim S&P 500 Utilities ETF	S&P 500 Equal Weight Utilities

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

Exhibit 25: ETFs Used in Constructing Exhibits 7 and 9 (cont.)

U.S.-LISTED ETFS

TICKER	TICKER	TICKER
FRI	First Trust S&P REIT Index Fund	S&P United States REIT Index
ERY	Direxion Daily Energy Bear 3X Shares	S&P Energy Select Sector Index
ERX	Direxion Daily Energy Bull 3X Shares	S&P Energy Select Sector Index
DUSL	Direxion Daily Industrials Bull 3X Shares	S&P Industrials Select Sector Index
WDRW	Direxion Daily Regional Banks Bear 3X Shares	S&P Regional Banks Select Industry Index
DPST	Direxion Daily Regional Banks Bull 3X Shares	S&P Regional Banks Select Industry Index
RETL	Direxion Daily Retail Bull 3X Shares	S&P Retail Select Industry Index
LABD	Direxion Daily S&P Biotech Bear 3x Shares	S&P Biotech Select Industry Index
LABU	Direxion Daily S&P Biotech Bull 3x Shares	S&P Biotech Select Industry Index
DRIP	Direxion Daily S&P Oil & Gas Exploration & Production Bear 3x Shares	S&P Oil & Gas Exploration & Production Select Industry Index
GUSH	Direxion Daily S&P Oil & Gas Exploration & Production Bull 3x Shares	S&P Oil & Gas Exploration & Production Select Industry Index
TECS	Direxion Daily Technology Bear 3X Shares	S&P Technology Select Sector Index
TECL	Direxion Daily Technology Bull 3X Shares	S&P Technology Select Sector Index
UTSL	Direxion Daily Utilities Bull 3X Shares	S&P Utilities Select Sector Index
FINU	ProShares UltraPro Financial Select Sector ETF	Financials Select Sector Index
FINZ	ProShares UltraPro Short Financial Select Sector ETF	Financials Select Sector Index

Source: S&P Dow Jones Indices LLC. Table is provided for illustrative purposes.

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